

The effects of gibberellic acid, smoke water, and cold stratification on the germination of native perennial seed

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Plant propagation is an important process in the production of horticultural crops and the conservation of native plants. Overcoming seed dormancy is a challenge that many growers face when propagating a more diverse plant palette for their company to offer. Cold stratification, a period of moist chilling, is needed to overcome physiological dormancy. The plant hormone, gibberellic acid, is known to be a germination promoter for plant species. Research has also shown that smoke can help overcome dormancy of some species because it contains karrikins, a recently discovered plant hormone that promotes germination similar to strigolactone hormones which are another germination promoting hormone. In this study, we evaluated the germination rates of twenty native plant species and their response to four chemical treatments: control, gibberellic acid, smoke water solution, and gibberellic acid with smoke water. Half of these treatments were kept at room temperature, and the other half were placed in a 38F cooler for three months to mimic cold stratification. After the temperature treatment, seeds were evaluated and counted twice a week for two weeks. Of the twenty evaluated species, sixteen had germination rates over 3%. Stratification increased germination by 54%. For chemical treatment, gibberellic acid and gibberellic acid with smoke water were significantly different from the control and increased germination an average of 66%. While smoke water was not significantly

different from the control for all sixteen species, increases in germination were observed for some species. *Agastache foeniculum*, *Arnoglossum plantagineum*, *Liatris ligulistylis*, *Oenothera macrocarpa*, *Penstemon cobaea*, and *Penstemon murrayanus* showed a response to chemical treatment and stratification. *Aquilegia canadensis*, *Callirhoe digitata*, *Ipomopsis rubra*, and *Penstemon grandiflorus* showed a response to chemical treatments only, and *Amorpha canescens*, *Delphinium carolinianum*, *Stenanthium gramineum*, and *Verbesina virginica* showed a response to only stratification. No growth defects were discovered upon further evaluation after sowing the seed. This study demonstrated that the combination of stratification with smoke water and/or gibberellic acid has a significant effect on seed germination rates of some native perennials. Our results help horticulturists and native plant conversationists better propagate a more diverse palette of plants.